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ABSTRACT

The relationship between the perceptual type of adult learners--i.e., visual or haptic--and their performance upon a visual discrimination task was studied to determine if the use of multi-image representations could improve the performance of adults of different perceptual types upon selected visual tasks. Subjects were 135 volunteers from College of Education courses at the University of Central Florida, ranging in age from 18-52. Lowenfeld's Table Segment of the Test of Subjective Impressions was administered to identify students as haptic, visual, or indefinite in cognitive style, and the Successive Perception Test I (United States Army Corps, 1944) was administered to test ability to synthesize parts into a whole. Perceptual type was determined by a combination of scores from the two tests. The screening process, however, did not produce a characteristic spread of perceptual types. Because of an unexpectedly small distribution of visuals (31%) and haptics (5%) in the sample population, there were not enough haptic subjects to assign randomly to each research design cell. Quantitative data were not obtained to permit statistical tests of significance for the hypotheses. An extensive literature review and a 42-item bibliography are included. (LMM)

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THE EFFECT OF PRESENTATION MODE ON VISUAL DISCRIMINATION BY VISUAL AND HAPTIC COLLEGE STUDENTS

A Research Project
Presented to the
College of Education
University of Central Florida

In Fulfillment of the
Requirements of
EME 6918

Beck McLaughlin Hutchinson
Spring, 1981

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Approved by

Date

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I thank my husband Lint for his warm and creative support and I thank Dr. Donna Toler for making this opportunity possible.

INTRODUCTION AND SIGNIFICANCE OF THE STUDY

With the emergence of instructional systems and message design, educators and researchers find themselves concerned with the building blocks of learning. The current direction is toward a greater understanding of the variety of elements which kaleidoscopically play into the learning process. These variables are being viewed in terms of the individual learner in an effort to create instruction which unites individual learning style with specific media attributes.

Many variables in the learning process have been isolated and are being studies. Some of these are: Field Dependence-Field Independence, Color, Space, Size and Depth Perception, Flicker Fusion, Perceptal Masking, Figural After Effect, Pattern Recognition, and Perceptual Closure. This study will focus upon PERCEPTUAL TYPE.

The complexity of the learning process is further enhanced and enriched by the abundance of 20th century technology. Although a great deal of research has been conducted to establish the usefulness of audio-visual media for teaching and training (Gallagher, 1978), little has been conducted to validate and confirm the particular relationship between the use of multi-media presentations and an individual's learning style (Toler, 1979).

The process of perceiving difference in a field of vision is referred to as perceptual discrimination. (Flemins and Levie, 1978). It is an essential part of visual

learning. Supporting evidence indicates that concept learning or concept formation rests upon the ability to perceive examples of a concept as well as non-examples of a concept (Klausmeier,1974).

Therefore, a medium which provides the possibility for simultaneous viewing, should be preferable in a learning situation to a medium which provides sequential viewing.

The attribute of simultaneity assumes even greater importance when dealing with individuals whose perceptual style has been found to be low visually. These individuals have been designated as haptic (Lowenfeld, 1945, 1975) in that their perception is sensory based. The haptic perceptual type lies on the opposite end of the spectrum from the extreme visual perceptual type whose perception is visually based and more abstract.

Because of the popularity of the multi-image medium, in education, advertising and industry, there is a need to provide a firm foundation on which to justify its utilization. The intent of this study is to contribute to the bank of data relating to the use of multi-image presentations as instructional tools. Multi-image utilization will be viewed in light of its relationship to cognitive style.

REVIEW OF THE LITERATURE

The life long work of Victor Lowenfeld creates a foundation for research into the nature of the relationship

between cognitive styles and perceptual type. His involvement in art eucation and creativity reveals the existance of two distinctly different types of individuals exhibiting different reactions to the world of experience (Lowenfeld, 1945). He has devised a battery of five tests to typologically classify his subjects into the catesories of visual or haptic. The visual is one who would literally be lost if in total darkness. Their learning is dependent upon visual experience as contrasted with a haptic who is dependent upon touch and Kinesthetic experience. The visual perceptual reacts to his or her environment as a spectator.

According to Lowenfeld, a visual will transform tactile and Kinesthetic experience into visual experiences while a haptic individual will not. The haptic individual will learn through subjective tactile experience, muscular sensation, and Kinetics that are eliciter from the environment. The haptic perceptual type learns from that which the visual perceptual type transforms into abstract or visual experience. A principal distinction between visuals and haptics is that a visual perceptual type can mentally retain imagery while haptics can not (Lowenfeld, 1945). This characteristic makes visual learning tasks more difficult for the haptic individual. These characteristics assume monumental importance in the tailoring of learning experiences to perceptual style.

Early media research focused upon very broad variables, those being the various media themselves. Textbooks, film,

television, audiotapes, etc., were studied and compared in terms of instructional effectiveness. Levie and Dickie came to the conclusion in 1973 that even though many studies had been conducted to compare instructional effectiveness, no one had really clarified and defined precisely what was being compared (Unwin and McAleese, 1978).

The gradual sophistication of research produced the refining of the definitions which Levie and Dickie sought. The concept of media attributes provided researchers with the means of specifying relevant variables within their studies. Taxonomies were formed to create classifications of media attributes (Bretz, 1971, Duncan 1969, Gagne' 1965, Tosti & Ball, 1969). Consequently research penetrated deeper into the nature of various media by isolating their characteristic attributes and utilizing them as experimental variables.

Experimental investigations into the relevancy of specific media attributes in instructional settings revealed that no single attribute had produced an overwhelmingly significant effect upon a particular learning task (Rasch, 1979). Relevancy then, had to be sought in a broader, more holistic context. The realization that media attributes are intimately bound up with specific learning tasks (Unwinn & McAleese,1978) opened the door to a wider vista in research design.

Studies in the future would be of integrated, multi-variate design that could embrace the many

correlatives between specific learning tasks, specific media attributes and specific individual cognitive styles.

Eventually research produced ten recurring cognitive patterns which have been termed cognitive (learning) styles. The individual brings their specific learning styles with them into learning situations. Relevant to this study is the research that has focused upon the recognition and mental processing of visual information. Lynna Ausburn's study helped re-confirm the status of visual and perceptual types as specific cognitive styles. Sponsored by the Air Force Human Resources Lab, she administered the Successive Perception Test I, the Hidden Figures Test, Matching Familiar Figures Test, and the Leveling Sharpening House Test to two hundred and six subjects. The data was analyzed to compare distributions of visuals and haptic types with the theoretical distributions predicted by Lowenfeld. Data was also examined to determine predictability or discrimination between visual and haptic perceptual types. It was found that each cognitive style has enough distinguishing characteristics to warrant their individual examination (Ausburn, 1979).

Two schools of thought emerge. One school views differences in visual and haptic perception and cognition as differences of degree. Arnheim (1969), Piaget and Inhelder ('956) represent this school. Their work ties visual perception to developmental processes operating within the human being.

Piaget proposed that haptic perceptual types translate tactile, kinesthetic experiences into visual perception and that the translation incorporates the tactile data. Such a construct is essentially developmental.

Contrasted with the developmental school is Lowenfeld's work. He stressed visual and haptic differences as existing within the very nature of perceptual and cognitive processes (Rasan, 1979). While he also believed that perceptual skills can be developed, he found that not all individuals process perception in the same manner nor are they dependant upon visual imagery formation for learning.

The major contrast between the two schools of thought lies in whether or not haptic, tactile or kinesthetic impressions are translated into visual impressions. Piaget maintained that they were, while Lowenfeld contended that they were not.

Studies conducted using the electroencephalograph to measure alpha rhythms provide a physiological construct in support of Lowenfeld's work. Typically an alpha rhythm is generated by visual or suggested imagery. Drewes (1958) concluded that the lack of alpha rhythms indicates no visual imagery formation. Contrariwise, the presence of alpha rhythms indicates the formation of visual imagery. Drewes' study revealed three categories of subjects. 25% of the population tested were visualizers, 25% were non-visualizers, and 50% were found to be responsives. Responsives could utilize both haptic and visual perception

when necessary.

Drewes' and Walters' categories of visualizers, non-visualizers and responsives are provocatively similar to Lowenfeld's typology of visuals, haptics and indefinites.

Also, out of the developmental school of thought, the question of achievement naturally arises. Some studies have explored the relationship of perceptual type to achievement. Erickson's work has indicated that haptic perceptual types tend to have lower achievement levels than visual perceptual types. He also reported that at the seventh grade level, haptic students were one-half to one year behind visual students in their reading achievement (Erickson, 1969). Todd also has reported a greater level of achievement attained by visual perceptual types in a study of perceptual type and contextual stimili (Todd, 1976).

Lowenfeld's studies have shown that a characteristic distribution of visuals and haptics exists in a given population (Lowenfeld 1945, Ausburn 1975). 50% are visual, 25% are haptic and 25% lie somewhere in between the two ends of the spectrum.

However, other studies exist which tend to negate the implications of Drewes' and Walters' studies. Paivio, Simpson and Rogers (1967) proposed that visual or suggested imagery is not the only suppressor of alpha rhythms, thus opening the door once again to the basic questions concerning the origins of perceptual types.

While the thrust of Piaget's and Lowenfeld's work was

directed toward the perception and cognition of the learner, other researchers looked outward to the media themselves. Jonassen and Saloman, two prominent media and instructional design researchers, indicated that a systematic effort was needed to evaluate and interrelate both cognitvie styles and treatment variables in order to justify their incorporation into instructional systems (Jonassen, 1979 & Saloman, 1974). Many studies began to incorporate treatment variables into their research designs.

Traditionally, research concerning the medium of multi-image presentations has focused on the treatment variable or the attribute of simultaneity and sequentiality. Tulen's work explored precisely this attribute. She found in her study with students in a middle school that the simultaneous projection of images was superior to a sequential mode in two varying degrees of complexity.

Whitley and Moore also focused on the simultaneity of multi-image presentations. Using participants from a community college, they also found that haptic students tended to score higher on a visual task that was presented simultaneously as opposed to the same task being presented sequentially. It was concluded that multiple imagery helps supplant (or perform for the learner), the task of retaining images for comparison. The implications of the study are that instructional design should embrace the learner characteristics, particularly those of cognitive style (Whitley & Moore,1979).

Ausburn, too, designed a study to reveal the differences in sequential and simultaneous multi-image presentations to both visual and haptic subjects. His interest was to develop instruction based on supplantation theory (Ausburn, 1975). The results support the use of the simultaneous presentation mode in supplanting a visual task. This is extremely important in the presentation of instruction to individuals classified as haptic because they possess no means of storing visual imagery. Simultaneous imagery presented via multi-image presentations supplants (or performs for the learner) mental imagery that would otherwise have to be performed by the haptic in comparing and contrasting visual images. It was found that the simultaneity of visual images inherent in a multi-image presentation helps the haptic individual retain visual imagery in order to complete a visual task.

Cooney and Allen (1964), Brydon (1974), and Toler (1979) have all found the simultaneous presentation mode to be effective with elementary level children.

However, other research has produced contrasting findings where no significant difference has been found between sequential and simultaneous presentation modes (Didoct, 1972 and Fradkin, 1971). Nor could Trohanis confirm the ability of the multiple image presentation to produce significant modifications in learner behavior as compared to single-image presentations (Trohanis, 1975).

The literature reflects the myriad facets of the concerns of educators with individual learning styles and specific media. The research is growing and together through scientific method and serendipity each piece of the puzzle contributes in its small and significant way to the larger, greater whole that slowly comes into focus. It also creates a complex backdrop for a further investigation into the effect of simultaneous and sequential presentation modes upon the visual processes of haptic and visual students.

STATEMENT OF THE PROBLEM

The research will identify the relationship between adult visual and haptic perceptual type and their performance upon a visual discrimination task as presented through sequential and simultaneous modes.

HYPOTHESES

The basic hypotheses of the study are as follows:

Students of the visual perceptual type will score higher than those of the haptic perceptual type on visual discrimination tasks.

Simultaneous presentation will result in higher scores

on visual discrimination tasks than will sequential presentation.

Students will score higher on a visual discrimination task at low levels of complexity than at high levels of complexity.

The simultaneous presentation mode will result in higher scores than the sequential mode for both perceptual types, but particularly for the haptic.

The simultaneous presentation mode will result in higher scores than the sequential presentation mode at both levels of complexity, but particularly at the high level of complexity.

Visuals will score higher than haptics at both levels of complexity, but particularly at the high level of complexity.

DEFINITION OF TERMS

A very specific vocabulary has crystallized out of media and educational research. In order to totally comprehend the implications and contributions of the large

body of literature dealing with media research, it is necessary to focus upon its nomenclature.

The term MULTI-IMAGE PRESENTATION will refer to two or more visual images simultaneously projected, side by side, by two or more projection sources on a wide screen or on a series of screens (Benedict & Crane, 1973).

A HAPTIC PERCEPTUAL TYPE (haptic) is a normal sighted person who prefers to orient him or herself to the world of experience through touch, bodily feelings, muscular sensations and Kinesthetic fusions (Lowenfeld, 1945). In this study a subject will be classified as haptic if <s>he scores 60% or more incorrect on the Successive Perception Test I and if <s>he is judged to have made a haptic response on the Table Segment of the Test of Subjective Impressions by a minumum of two out of three judges.

A VISUAL PERCEPTUAL TYPE (visual) is a normal sighted person who depends upon his or her eyes as a primary intermediary in perception. For this study, a subject will be classified as visual if <s>he scores 60% or more correct on the Successive Perception Test I, and if <s>he is judged to have made a visual response on the Table Segment of the Test of Subjective Impressions by a minumum of two out of three judges.

A MEDIUM ATTRIBUTE is the capability of a specific medium. It is any structural component which influences the type of material one can present, the arrangement of that material, or the way it is presented (Saloman & Snow, 1968). This concept of media attributes allows specification of relevant variables in media research design.

The SEQUENTIAL PRESENTATION MODE is the projection of one image at a time presented on a single screen. In this study, one image will be projected side by side, one after the other, in a sequential or linear fashion on a single screen by a single projection source.

The SIMULTANEOUS PRESENTATION MODE (of a multi-image presentation) is the simultaneous projection of two or more images on a wide screen or multiple screens by two or more projection sources. In this study three images will be projected simultaneously, side by side, by three separate projection sources on three separate screens.

LIMITATIONS OF THE STUDY

The findings and conclusions are limited in as much as the students who participated in the experiment were not randomly chosen. They were not drawn from all subject

disciplines offered by the University of Central Florida. A large percentage of the subjects were drawn specifically from the College of Education.

If specific perceptual types radiate toward specific vocational interest and curricula, then a sampling of College of Education students would only provide a visual-haptic spectrum specific to that discipline. The spectrum produced may not be as broad as that of a random sampling from all disciplines.

The study is further limited by the fact that the panel of judges used to designate visual or haptic responses in the Table Segment of the Test of Subjective Impressions is the same team that is conducting the research.

Two tests are used by the researchers to determine a typically visual or haptic response. A discriminating element in the Table Segment of the Test of Subjective Impressions is the subject's use of perspective. The use of perspective is classified as a visual response. The absense of perspective is classified as a haptic response. The classification model makes no allowance for the use of perspective as an acquired or learned skill. The ultimate determination of perceptual type rests upon the validity of both the Successive Perception Test I and the Test of Subjective Impressions used conjunctively.

ASSUMPTIONS

In this study it will be assumed that perceptual type, both visual and haptic, can be determined from the scores obtained on the Table Segment of the Test of Subjective Impressions and The Successive Perception Test I.

It will further be assumed that the simultaneous presentation mode as represented in the visual location task corresponds to the medium attribute of simultaneity that exists in non-experimental conditions.

The final assumption is that the variable of simultaneity in multi-image presentations can be effectively isolated as a medium attribute for experimental purposes.

PROCEDURES FOR COLLECTING DATA

133 subjects were drawn from courses offered within the College of Education during Spring Quarter, 1981. While the courses were education oriented, they were open to students of other majors as part of the broad based curriculum required by the University.

The subjects were invited class by class, to participate in the study. Those that volunteered were provided with answer sheets. They were informed that the intent of the study was to fathom the nature of learning and that if they had questions, they could be answered when the testing was completed.

Lowenfeld's Test of Subjective Impressions was administered first. The Successive Perception Test I

(United States Army Air Corps, 1944) then followed. It was projected via a large Setchell Carlson monitor on video tape. The lights were lowered and the students were asked to re-seat themselves that they might have direct viewing access to the monitor.

PROCEDURES FOR TREATING DATA

The data will be analyzed through a 2x2x2 factorial design with repeated measures on one factor (Toler, 1979). Factor A will be the presentation mode, both sequential (1) and simultaneous (2). Factor B will be the perceptual type, both visual (1) and haptic (2). Factor C will be the level of complexity, both low (1) and high (2).

METHODOLOGY AND PROCEDURES

135 subjects were invited to participate in the experimental study. They were drawn from College of Education courses offered by the University of Central Florida. They ranged in age from 18 to 52. In class standing they ranged from Freshmen to Seniors. Not all participants were Education majors. There was a broad mixture of stuents from the Colleges of Humanities and Fine Arts, Engineering, Sciences and Education.

Answer sheets were distributed to the individual classes participating in the study.The subjects were informed that

the intent of the study was to investigate the nature of learning and that if there were questions concerning the nature of the research, they could be answered when the testing was completed.

Lowenfeld's Table Segment of the Test of Subjective Impressions was administered first. There are 2 parts to this test. The subjects are asked to draw a glass of water on a table. Secondly, they are requested to draw a table with a chess board upon it. A panel of 3 judges scored each response according to Lowenfeld's recommendations (Lowenfeld, 1945) as either a haptic, visual or indefinite response. In those instances where 2 out of 3 judges agreed upon the classification, the subject was retained for testing the following week.

Secondly, the Successive Perception Test I (United States Army Corps, 1944) was administered to each class in order to test the subject's ability to synthesize parts into a whole. The Successive Perception Test I was scored by the experimenter. Those visuals who scored 60% or more correct and those haptics who scored 60% or more incorrect were retained for testing the following week.

A third test, the Test of Visual versus Haptical Word Association was also administered. It was found by all 3 judges to be virtually impossible to score because of the variety of unclassifiable responses. The administration of this test was discontinued.

Ultimately, designation of visual or haptic type was

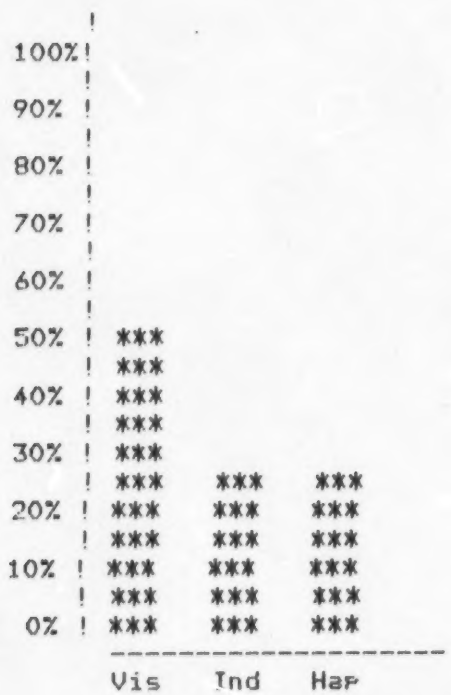
determined by a combination of scores from the Table Segment of the Test of Subjective Impressions and the Successive Perception Test I. If an individual scored 60% or more correct and was judged to have made a visual response on the Test of Subjective Impressions, the subject was classifed as visual. If the subject scored 60% or more incorrect and made a haptic response on the Test of Subjective Impressions, the subject was classified as haptic. 7 haptics and 42 visuals were identifed from the 135 subjects tested.

RESULTS AND ANALYSES

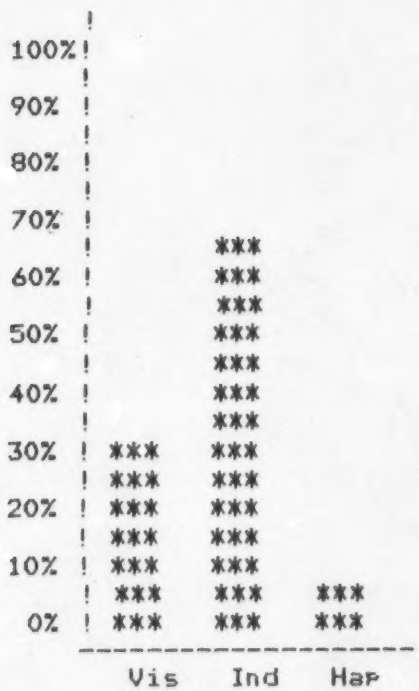
The screening process utilized in the research design, to discriminate haptics from visuals did not produce a characteristic Lowenfeldian spread of perceptual types. Lowenfeld's work consistantly established a characteristic distribution of haptics, visuals and indefinites. Rounding to allow for distribution error, he described a theoretical population consisting of 50% visuals, 25% haptics, and 25% indefinites (Ragan, 1979). Ausburn's studies also confirmed this spread. He found 48% of the population to be visual, 22.5% haptic, and 29.5% indefinite. The results of this study produced a distinctively atypical spread of 5% haptics, 31% visuals and 64% indefinites.

TABLE I.

Distributions
of Perceptual Type in
Lowenfeldian and U.C.F. Populations



Lowenfeldian Population



U.C.F. Population

Vis = Visual
Ind = Indefinite
Hap = Haptic

CONCLUSIONS

The purpose of the study was to determine if the use of multi-image presentations could improve the performance of adult participants of different perceptual types upon selected visual tasks (Toler, 1980).

However, because of such an unexpectedly small distribution of visuals (31%) and haptics (5%) in the sample population, there were not enough haptic subjects to assign randomly to each cell in the research design. Quantitative data was not obtained to permit statistical tests of significance for the hypotheses.

DISCUSSION

The developmental and organic schools of thought concerning perceptual type are sharply silhouetted against a backdrop of unknown variables. The literature reveals that studies have approached the question of perceptual type from the interior. The focus has been upon the individual, either from a clinical or physiological point of view. Beyond a specific medium, no one has of yet, explored the external or exterior implications of perceptual type. Toler hints at this in her summarizing questions. They delve into the effects of visual media, visual literacy, developmental implications, vocational choice, perceptual type trainability and achievement (Toler, 1979). Does our

technolgical bias affect perceptual type? Does a particular cultural sensitivity partially determine the formation of percetual type? Does a broad cultural style exist which embraces both the developmental and the organic aspects of perceptual type? Is perceptual type physiologically manifest within the human structure or is it ascending a developmental ladder of growth? Closely related to the breadth of cultural variables are questions raised concerning vocational and professional interests as related to perceptual type. Does perceptual type influence vocational preference? Would a heavier distribution of haptics occur in a community college setting? When community college students transfer to a university is their visual perception enhanced? Would a larger distribution of visuals occur in an art school? Would a wider distribution of haptics occur in a less technologically oriented geographic location?

These questions require an expansive reseach design that not only encompasses the individual and the media, but that also embrace cultural variables. Such an approach suggests a firmly based social or anthropological study.

RECOMMENDATIONS

It is recommended that further research be conducted in order to shed light upon the many remaining variables which affect perceptual type. Such studies would help clarify the

nature of cognitive style and would directly provide a solid foundation upon which to base media research design.

Research is needed in establishing the true nature of perceptual style. Comparitive studies are needed to span all age levels. Although there have been studies conducted with infants, (Gottfried, Rose & Bridger, 1978) elementary, secondary, and college-level students, the middle-aged and elderly sector of the population has not been explored. Anthropological studies are needed to further explore cultural variables which play into perceptual processes.

The present study should be repeated in its present design in other university settings in order to further validate the problems put forth in the hypotheses. It should also be repeated in its present design in a community college setting. Whitley and Brown in their community college study did not obtain a characteristic Lowenfeldian spread. They found greater numbers of haptics and smaller numbers of visuals and felt that the vocational orientation of community colleges may attract haptics. They also mentioned the liberal admissions policies that community colleges generally have, which once again opens up the question of perceptual type as related to achievement (Whitley and Brown, 1979). Studies should explore the possible alterations of perceptual type among first year community college transfer students. Data collected should also be analyzed in light of the participants' choice of majors.

Presently, the researcher ... preparing to study the relationships between perceptual type and personality type as indicated by the Myers-Briggs Type Indicator.

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